Annexure – II

Revised /Updated Syllabus

Civil Engineering

Course Code	Course Name	Hours per			Total
		L	T	P	Credits
EN3ES10	Strength of Material	3	1	2	5

UNIT I Simple Stress and Strains
Stresses in compound bars, composite and tapering bars, Thermal stresses and strains, principle of superposition.
Complex Stress and Strains: -Two dimensional and three-dimensional stress system, Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses.

UNIT II Deflection of Beam
Deflection of beams by Double Integration Method, Macaulay's Method and Conjugate Beam Method, Moment Area Method.

UNIT III Bending & shear stresses:
Theory of simple bending, Concept of pure bending and bending Stress, Equation of bending, Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed load. Bending & shear stress distribution across a section in Beams.

UNIT IV Torsion of Shafts
Concept of pure torsion, Basic assumptions, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Combined Bending and Torsion.
Pressure Vessels: -Thin walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume.

UNIT V Columns and Struts
Stability of Columns; buckling load of an axially loaded column with various end conditions; Euler's and Rankine's formula; Columns under eccentric load.
Introduction of Unsymmetrical Bending, Shear center and Theory of failure.

Text Book:-

1. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publications.
2. R. Subramaniam, Strength of Materials, Oxford University Press.
3. Debrath Nag, Strength of Material, Wiley.

Reference Book:-

1. Negi L. S, Strength of Materials, McGraw Hill Professional.
2. Stephen P. Timoshenko, Strength of Materials (Part 1) Krieger Pub Co.
3. F.L. Singer and Pytel, Strength of materials, HarperCollins College Div.

List of Practicals:-

1) To determine the flexural rigidity of beam and compared it with theoretical value.
2) Comparison of Euler's buckling load with theoretical value.
3) Determination of shear force of beam and comparison with the theoretical values.
4) Determination of bending moment of beam and comparison with the theoretical values.
5) To determine the deflection of Beam by the use of deflection-beam apparatus.
6) Study of Universal testing Machine.
7) To determine the reaction of beam.
8) To study the Mohr circle of stresses.
9) To understand the concept of unsymmetrical bending.
10) To determine the shear centre of a given section.

Computer Science Engineering

B.Tech. CSE 2017 Batch Sem-V [July-Dec2019]						
Sr. No.	Course Code	Course Name	L	T	P	Credits
1	CS3CO24	Computer Graphics & Multimedia	3	1	2	5
2	CS3CO26	Software Engineering	3	1	2	5
3	CS3CO12	Computer Networks	3	1	2	5
4	CS3CO27	Compiler Design	3	0	2	4
5	CS3ELXX	Elective-2	3	0	0	3
6	EN3MC04	Human Values & Ethics	2	0	0	0
		Total	17	3	8	22
		Total Contact Hours	**28**			
CS3EL06 Internet of Things CS3EA07 Machine Learning CS3ED06 Data Science						

B.Tech. CSE 2017 Batch Sem-III [July-Dec2019]						
Sr. No.	Course Code	Course Name	L	T	P	Credits
1	CS3BS03	Discrete Mathematics	3	1	0	4
2	CS3CO23	Object Oriented Programming	3	1	2	5
3	CS3CO21	Data Structures	3	1	2	5
4	CS3CO22	Computer System Architecture	3	1	2	5
5	CS3CO29	Digital Electronics	3	1	2	5
6	EN3MC02	Technical English	2	0	0	0
		Total	17	5	8	24
		Total Contact Hours	**30**			

Course Code	Course Name	Hours per Week			Total Credit
		L	T	P	
CS3CO24	Computer Graphics & Multimedia	3	1	2	5

UNIT I

Introduction to Raster Scan Displays, Pixels, Frame Buffer, Vector & Character Generation, Random Scan Systems, Display Devices, Scan Conversion Techniques, Line Drawing: Simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle Drawing and Bresenham's Algorithm, Polygon Fill Algorithm: Boundary-Fill and Flood-Fill Algorithms.

UNIT II

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection, Inverse Transformation, Homogenous Coordinate System, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms.

UNIT III

3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface Elimination: Depth Comparison, Back Face Detection Algorithm, Painter's Algorithm, and Z-Buffer Algorithm.

UNIT IV

Curve Generation, Bezier and B-spline Methods. Basic Illumination Model: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Ray Tracing, Color Models like RGB, YIQ, CMY, HSV.

UNIT V

Multimedia: Characteristics of a Multimedia Presentation, Multimedia Architecture, Text – Types, Unicode Standard, Text File Formats, Audio- Components of an Audio System, Digital Audio, Digital Audio Processing, Audio File Formats, Video- Digital Video, Digital Video Processing, Video File Formats.

Animation: Uses of Animation, Principles of Animation, 3D Animation, Animation File Formats, Animation Software, MPEG Standards.

Text Book

1. Donald Hearn and M.P. Becker Computer Graphics Pearson Pub.
2. Vaughan, Tay. *Multimedia: Making it work*. Tata McGraw-Hill Education.

Reference Books :

1. Parekh, Principles of Multimedia, Tata McGraw Hill.
2. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill.
3. Maurya, Computer Graphics with Virtual Reality System, Wiley India.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credit
CS3CO26	Software Engineering	3	1	2	5

UNIT I

Software Engineering – Definition, Process, Evolution and Myths, Generic Process Model, Framework, Process Models – Waterfall, Incremental, Evolutionary, Spiral, Component Based Model, Rational Unified Process

UNIT II

Requirement Analysis, Stakeholders, Elicitation Techniques, Requirement Modelling - Use Cases, Activity Diagrams, Swimlane Diagrams, Data Modelling, Data Flow Diagram, Overview of Class Based Modelling, requirement Tracking

UNIT III

Principles of Software Design, Design Concepts – Abstraction, Architecture, Modularity, Relationships, Design Model, Component Design, User Interface Design, Configuration Management

UNIT IV

Software Quality, Approaches for Quality Assurance, Software Testing, Verification and Validation, Types of Testing, Risk Assessment, Risk Mitigation, Monitoring and Management

UNIT V

Software Metrics, Process Metrics, Product Metrics, Function Oriented Metrics, Software Project Estimations, Function Point Based Metrics, COCOMO Models, Project Scheduling, Effort Distribution

Text Book:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill.
2. Ian Sommerville, Software Engineering, Pearson Education Inc., New Delhi

Reference Book:

1. Fundamentals of Software Engineering by Rajib Mall, – PHI

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
CS3C012	Computer Networks	3	1	2	5

UNIT I

MAC Sublayer: Static and Dynamic Chanel Allocation in LAN, MAC protocols-ALOHA and Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, Collision Free protocols, Limited Contention Protocols. Ethernet-Ethernet Cabling, Frame Format, Binary Exponential Back-off Algorithm, Ethernet Performance, Fast and Gigabit Ethernet, MAC address.

UNIT II

Network Layer: Design issues, Routing algorithms: Dijkstra's algorithm, Bellman-ford algorithm, Link State Routing, Hierarchical Routing, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets. QOS-techniques for achieving good QOS, Traffic Management, Integrated and Differentiated Services. RSVP

UNIT III

Internetworking, Tunneling, Fragmentation and Reassembly, IP protocol, IPv4 Addresses, Subnet Addressing, Subnet Mask, Super netting CIDR, NAT, ICMP-header, message type, trace route, ARP & RARP, BOOTP and DHCP: Address allocation, configuration & packet format, OSPF and BGP, Comparative study of IPv4 & IPv6.

UNIIT IV

Transport Layer: Design Issues, Transport Service Primitives, Socket Programming, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management. UDP: Header Format, RPC, RTP, Session layer: Authentication, Authorization, Session layer protocol (PAP, SCP, H.245).

UNIT V

Presentation layer: Data conversion, Character code translation, Presentation layer protocol. Application Layer: WWW Architectural Overview, URL-Static and Dynamic Web, FTP, SSH, Email- Architecture and Services, SMTP, DNS-Name System, Resource Records, Name Servers, Network Management (SNMP).

Text Book: -

1. Computer Networks-V Edition, Andrew S. Tanenbaum-Pearson Education (Chapter No.4-7).
2. Data and Computer Communication-VIII Edition, William Stallings-Pearson Education(Part-3-6)
3. Data Communication and Networking- V Edition, Behrouz A.Fourouzan- Mc Graw Hill Publication (Part-3-6).
4. Communication Networks-Fundamental concepts and key Architecture, Alberto Leon-Garcia &IndraWidjaja-TMH (Unit1,2,7,8,10,12)

Practical Understanding

1. Data Communication Principles for fixed and wireless networks-Aftab Ahmad, Kluwer Academic Publishers.
2. Data Communications Networking Devices:-Operation, Utilization, Lan and Wan Interworking-IV Edition, Gilbert Held-John Wiley and Sons.

Course Code	Course Name	Hours per Week			Total Credit
		L	T	P	
CS3CO27	Compiler Design	3	0	2	4

UNIT I

Basic machine, FSM, Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NDFA, Regular Expressions, CFG, Chomsky Hierarchy of Language, Derivation and Parse Tree, Ambiguity

UNIT II

Compiler structure: Pass Structure of compiler, Translators, Phases of Compilers, Lexical Analyzer: Role of Lexical Analyzer, Specification of tokens, Recognition of tokens and input Buffering, The Syntactic Specification of Programming Languages, Cross Compiler, bootstrap Compiler

UNIT III

Basic Parsing Techniques: Top Down parsers, Recursive Descent Parsers, Predictive Parsers. Bottom Up Parsing: Operator precedence parsing, LR parsers, Construction of SLR, Canonical LR and LALR parsing tables.

UNIT IV

Syntax Directed Definition, Translation Scheme, Synthesized and inherited attributes, dependency graph, Construction of syntax trees, S-attributed and L-attributed definitions, Three address codes, quadruples, triples and indirect triples, Translation of assignment statements.

UNIT V

Storage organization, activation trees, activation records, allocation strategies, Parameter passing symbol table, dynamic storage allocation, Basic blocks and flow graphs, Optimization of basic blocks, Loop optimization, Global data flow analysis, Loop invariant computations.

Text Book:

1. K.L.P. Mishra, Theory of computer Science, Prentice Hall of India Pvt. Ltd.
2. Principle of Compiler Design, Alfred V. Aho, and J.D. Ullman, Narosa Publication.
3. John E. Hopcroft, Jeffery Ullman, Introduction to Automata theory, Langauges & computation, Narosa Publishers.

Reference Book:

1. Compiler design in C, A.C. Holub, PHI.
2. Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, Galgotia Publication.
3. Compiler Design, Kakde.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
CS3EA07	Machine Learning	3	0	0	3

UNIT I Introduction to machine learning, Applications, Classification: Supervised Learning: Linear Regression: Cost function, Gradient descent; Logistic Regression, Nearest-Neighbors, Gaussian function.

UNIT II Overfitting and Underfitting, Regularization, Bias and Variance, Decision Trees, Naïve Bayes, Support Vector Machines, Kernel Methods.

UNIT III Unsupervised Learning: Clustering: K-means, Dimensionality Reduction: PCA, Matrix Factorization and Matrix Completion, Ranking, Recommender System.

UNIT IV Introduction to Neural Network, Perceptron, Feed forward, Back Propagation, Recurrent Neural Network. Introduction to Python machine learning libraries: Keras, Tensorflow and Theano.

UNIT V Evaluating Machine Learning algorithms and Model Selection, Ensemble Methods: Boosting, Bagging, Random Forests, Deep learning Semi-supervised Learning, Reinforcement Learning.

Text Book:

1. Machine Learning, Tom Mitchell, McGraw Hill.
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer (freely available online)

Reference Books:

1. Christopher Bishop, Pattern Recognition and Machine Learning, Springer.
2. Hal Daumé III, A Course in Machine Learning (freely available online)
3. Sebastian Raschka, Vahid Mirjalili, Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow, Packt Publishing.

Electronics & Communication Engineering

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
ECSC089 / EEEC049	Control System	3	0	2	4

UNIT I Introduction

Concept of control system, basic terminology, objectives/specifications. Mathematical modeling of physical systems such as mechanical and electrical systems, differential equations, transfer function, block diagram representation and reduction, signal flow graph techniques, Mason's Gain formulae. Concept of feedback, open loop and closed loop systems, types and effects of feedback.

UNIT II Time response analysis

Standard test signals, time response analysis (1st and 2nd order), Transient and steady state response, response parameters and their qualitative analysis; Transient and steady state response analysis for 1st and 2nd order systems with negative feedback; effect of close loop on system parameters. Stability of linear systems, stability norms, effects of pole location on system stability, necessary
conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis. Root Locus concept, guidelines for sketching Root-Locus, applications of root locus.

UNIT III Frequency response analysis

Concept of frequency response, Frequency response plots such as Polar plots, Bode Plots, log-magnitude versus Phase-Plots, M and N circles, Correlation between time and frequency response.
Frequency domain stability analysis, Nyquist stability criterion, stability margins: phase margin and gain margin. Relative stability analysis using Nyquist plot and Bode plot.

UNIT IV Compensators and controllers

Design problem, types of compensation techniques, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain. P, PD, PI, PID error control strategies; effect of controllers on transient and Steady state response.

UNIT V State space analysis

State space representation of systems. State Space equations in Canonical forms, Modeling of electrical and mechanical systems in State Space form, Solution of state space equation, state transition matrix, Controllability and Observability, Relation between transfer function and state space representations. Design of state feedback controller.

Text books

1. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International Publishers,
2. Benjamin C. Kuo, "Automatic Control systems", Wiley India Pvt. Ltd.
3. K. Ogata, "Modern Control Engineering", PHI.

Reference Books:

1. M. Gopal, "Control System Principles and Design", Tata McGraw Hill, New Delhi.
2. S. Salivahanan, "Control System Engineering", Pearson Education, New Delhi.

List of Practicals

1. Transfer Function from Zeros and Poles
2. Zeros and Poles from Transfer Function
3. Impulse, Step and Ramp Response of A Transfer Function
4. Time Response of A Second Order System
5. Root Locus from A Transfer Function
6. Bode Plot from A Transfer Function
7. Nyquist Plot from A Transfer Function
8. Transfer Function from State Model State Model from Transfer Function
9. State from Zeroes and Poles Zeros And Poles From State Model
10. Lag and Lead Compensator
11. Pid Controller

SPECILAZATION PROPOSED FOR 2018 BATCH

It is proposed to offer following specializations for 2018 batch. The speculation scheme is implemented through the program electives relevant to specific specializations.

S.No.	Specialization	Remark
1.	Computer Technology	Already offered to 2016 and 2017 batches.
2.	VLSI Technology	Already offered to 2016 and 2017 batches.
3.	Communication Engineering	Already offered to 2016 and 2017 batches.
4.	Microwave Engineering	Already offered to 2016 and 2017 batches.
5.	IOT	Proposed for 2018 batch.

Electrical Engineering

EX3CO12	Power System-II*	3	1	2	5

	III - Year (Odd sem) Elective
EE3EP03	Wind and Solar Energy Conversion Systems#
EE3EL08	Reliability Engineering*

*- Modification in Syllabus

#- New Subject

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EE3CO12/ EX3CO12	Power Systems-II	3	1	2	5

UNIT I

Introduction and Modeling- Advantages and problems in interconnected and deregulated power systems, distributed generation, formation of bus admittance and impedance matrix, modeling of regulating transformer. Introduction to SCADA systems and WAMS.

UNIT II

Load Flow Analysis & Economic Dispatch-Bus classification, load flow equations, Gauss Seidel, Newton-Raphson and FDLF methods for the solution of the load flow equations. Economic dispatch, system constraints, economic dispatch neglecting losses, economic dispatch including losses, automatic load dispatching.

UNIT III

Load Frequency control- Load frequency problem, speed governing systems, model of speed governing systems, turbine model, generator-load model, limits on frequency variation, frequency control in parallel operation of two alternators, two area load frequency control.

UNIT IV

Voltage control –Reactive power & voltage control, production & absorption of reactive power, methods of voltage control, static VAR systems, excitation systems, general block diagram representation of voltage regulators.

UNIT V

Power System Stability –Steady-state, dynamic and transient stability, swing equation of a synchronous machine connected to an infinite bus, power angle curve, description of the phenomena of loss of synchronism in a single-machine infinite bus system following a disturbance like a three phase fault, solution of swing equations using step by step methods, equal area criterion, methods of improving stability.

Text Books:

1. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc.
2. C. L. Wadhwa, Electrical Power systems, New age International.
3. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, McGraw Hill Education.

References Books:

1. O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill Education.
2. P. Kundur, Power system stability and control, McGraw Hill Inc.
3. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education.
4. Antonello Monti, "Phasor Measurement Units and Wide Area Monitoring Systems", Elsevier Science.
5. Stuart A. Boyer, SCADA: Supervisory Control and Data Acquisition, The Instrumentation, Systems and Automation Society.

List of Practicals:

1. To develop a program for formation of Y-bus matrix for N bussy stem.
2. Load flow solution for 3-bus system using Gauss-Seidel method.
3. Load flow solution for 3-bus system using Newton Raphson method.
4. Load flow solution for 3-bus system using FDLF method.
5. Load flow solution for IEEE 6-bus system using Newton Raphson method.
6. Model determination of OLTC.
7. Determination of transient stability limit of synchronous machine connected to infinite bus using equal area criteria. using graphical approach.
8. Assessment of transient stability of a single machine system.
9. Effect of compensation on voltage profile.
10. Solution of economic dispatch problem.

Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
EE3EP03/ EX3EP03	Wind and Solar Energy Conversion Systems	3	0	0	3

UNIT I

Electricity Generation Using Renewable Energy Sources: over view of conventional & renewable energy sources, need & development of renewable energy sources, types of renewable energy systems, future of energy use, global and Indian energy scenario, renewable and nonrenewable energy sources, energy for sustainable development, basic principles of wind and solar energy conversion, wind mills, wind and solar energy system site selection considerations.

UNIT II

Solar Thermal Applications- solar water heaters, solar dryers, solar cooling and refrigeration thermal storage, solar industrial heating system, solar cookers, solar thermal power generation. Solar photovoltaic energy conversion, solar cells, I-V characteristics, effect of variation of solar insolation and temperature, losses, efficiency, MPPT. Classification of solar PV systems.

UNIT III

Wind Turbines Types: Vertical axis Type, horizontal axis, pitch control, yaw control, electrical and mechanical aerodynamic braking, wind turbine dynamics with dc and ac generators: induction and synchronous generators, variable speed operation, effect of wind turbulence, power electronics converter and inverter interfaces for wind energy utilization system for isolated system.

UNIT IV

Solar PV Applications: design of irrigation system, street lighting system and rooftop mounted system.

Wind farm electrical design, planning of wind farms, application- wind pumps, wind battery charges, wind electricity generators, maintenance and operation, environmental assessment, noise, visual impact etc.

UNIT V

Hybrid Systems & Micro – Grids: Need for hybrid systems range and type of hybrid systems, case studies of PV-Wind, PV-wind-battery, PV-wind-diesel systems (block diagram).

Concept and definition of micro-grid, micro-grid drivers and benefits, review of sources of micro-grids, typical structure of a micro-grid, AC and DC micro-grids. Power Electronics interfaces in DC and AC micro-grids, protection of micro-grids.

Text Books:

1 B. H. Khan, Non-conventional energy sources, McGraw hill.
2 C. S. Solanki, Solar Photovoltaics - Fundamentals, Technologies and Applications, Prentice Hall India Learning Private Limited.
3 Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK
4 Hassan Bevrani, Microgrid Dynamics and Control, Wiley-Blackwell.

Reference Books:

1 Foster R., Ghassemi M., Cota A., "Solar Energy", CRC Press.
2 Garg H.P., Prakash J., "Solar Energy Fundamentals and Applications", Tata McGraw-Hill.
3 Johnson Gary, L. "Wind Energy Systems", Prentice Hall, New York.

Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
EE3EL08/ EX3EL08	Reliability Engineering	3	0	0	3

UNIT I

Introduction to Reliability and Indices: Methods of reliability improvement, discrete and continuous random variable and their probability distribution functions. Truncated distribution functions. Introduction to probabilistic simulation, some important distribution functions, application of binominal and normal distribution functions.

UNIT II

Component Reliability Models: Component reliability, hazard function, failure laws, exponential failure law, wear in period and its importance. Safety and reliability, effect of preventive maintenance on reliability.

UNIT III

Network Reliability Evaluation Method: Reliability evaluation of series, parallel, and series–parallel network. Complex network reliability evaluation using event space, decomposition, tie-set, cut-set method, stand by system and load sharing system, multi state models.

UNIT IV

Reliability Evaluation for Repairable Systems: Markov process, state diagram, availability and unavailability function. Evaluation of time Dependent and limiting state probabilities. MTTF calculation. Concept of frequency and durations, state enumeration method for evaluating failure frequency, MUT, MDT, frequency balance approach.

UNIT V

Data Classification and Parametric Estimation: Data collection and classification, censoring, non-parametric and parametric method, MTTF calculation using data. Parametric estimation using least square estimats. Reliability based maintenance Practices.

Text books

1. R. Billinton, R.N.Allon, "Reliability evaluation of engineering system: concept and techniques", Springer Int. edition.
2. C.E. Ebeling, "Reliability and maintainability engineering", TMH.
3. E.E. Lewis, "Introduction to reliability engineering", John Wiely and Sons.

Reference Books:

1. David J. Smith, "Reliability maintainability and risk", Elsevier.
2. Joel A. Nochlas, "Reliability Engineering: Probability Models and maintenance methods", Taylor and Prancis.

INFORMATION TECHNOLOGY SEMESTER V / ODD SEM						
S. No	Course Code	Course Name	L	T	P	Credit
1	IT3CO06	Design and Analysis of Algorithms	3	1	2	5
2	IT3CO10	Computer Networks	3	1	2	5
3	IT3CO22	Software Engineering	3	1	2	5
4		Elective 2	3	0	0	3
5		Elective 3	3	0	0	3
6		Open Elective 1	3	0	0	3
7	EN3MC01	Open Learning Courses	1	0	0	0
8	EN3MC02	Technical English	2	0	0	0
Total			**21**	**3**	**6**	**24**
Total Contact Hours			**30**			

Programme Elective 2

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3EA06	Natural Language Processing	3	0	0	3
2	IT3EI06	Cyber Ethics and Laws	3	0	0	3
3	IT3EL03	Information Storage and Management	3	0	0	3

Programme Elective 3

S. No	Course Code	Course Name	L	T	P	Credit
1	IT3EA03	Soft Computing	3	0	0	3
2	IT3ED07	Data Science	3	0	0	3
3	IT3EI08	Information Security	3	0	0	3

Open Elective 1

S. No	Course Code	Course Name	L	T	P	Credit
1	OE00018	Python Essentials	3	0	0	3

Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
IT3C006	Design and Analysis of Algorithms	3	1	2	5

UNIT I

Introduction to Algorithms: Algorithms, Analysis, Performance issues: Time and Space complexity; Asymptotic Notations.

Mathematical preliminaries: functions & their growth rates; Recurrence relations, Methods for solving recurrences. Elementary Sorting techniques and its analysis: Selection, Bubble, Insertion sort.

UNIT II

Sorting and Divide & Conquer: Advance sorting techniques and its analysis: Heap sort, Radix sort and Bucket sort. Divide and Conquer techniques and its analysis - Binary search, Merge Sort, Quick sort, Strassen's Matrix multiplication.

UNIT III

Greedy Algorithms: Greedy problems and its complexity analysis: Optimal merge patterns, Huffman coding. Minimum spanning trees, Knapsack problem, Job sequencing with deadlines, Single source shortest path problem - Dijkstra's Algorithm.

UNIT IV

Dynamic Programming: Dynamic programming problems and its complexity analysis: 0/1 Knapsack, Multistage graph, Bellman Ford Algorithm, Reliability design, Floyd-Warshall algorithm, Matrix Chain Multiplication, Longest Common subsequence.

UNIT V

Backtracking and Branch & Bound: Backtracking Approach: N-Queen's problem, Hamiltonian cycle, Graph coloring problem, Sum of Subset problem. Introduction to branch & bound method, examples of branch and bound method like15 puzzle traveling salesman problem, 0/1 knapsack. An introduction to P, NP, NP Complete and NP hard problems.

Text Books:

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, MIT Press/McGraw-Hill
2. E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications

Reference Books:

1. Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addision Wesley.
2. A V Aho, J E Hopcroft & J D Ullman, The Design and Analysis of Computer Algorithms,Addison Wesley.
3. R.C.T.Lee, S S Tseng, R C Chang, Y T Tsai " Introduction to Design and Analysis of Algorithms, A Strategic approach" Tata McGraw Hill.
4. Anany Levitin,"Introduction to the Design & Analysis of Algorithm ",Pearson
5. Gilles Brassard, Paul Bratle "fundamentals of Algorithms", Pearsons

Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
IT3CO10	Computer Networks	3	1	2	5

UNIT I

Introduction: History and development of computer networks, networks topologies. Layering and protocols. Design issues, Interface and services, connection oriented and connectionless service, ISO-OSI reference model, Description of layers, comparison with TCP/IP, Introduction to internetworking devices.

UNIT II

Data Link Layer: Design issues, framing, error detection and correction, elementary and sliding window protocols, 1-Bit, Go Back N, Selective repeat, Bit oriented Protocol: HDLC, SDLC.

UNIT III

Medium Access Control Sub Layer: Channel allocation problem, static and dynamic channel allocation, pure ALOHA, Slotted ALOHA, multiple access protocols, CSMA, CSMA/CD, CSMA/CA, IEEE Standards: 802.3 Ethernet, 802.4 token bus, 802.5 token ring, 802.11 Wireless LANs, 802.15 Personal Area Networks (Bluetooth).

UNIT IV

Network Layer: Design issues, Routing algorithms: flooding, Bellman ford, Link state routing, hierarchical routing, Dijkstra's algorithm, broadcast and multicast routing, RIP, OSPF, Path vector, Network Address Translation (NAT), Internet Protocol, IPv4 header format, Addressing, Subnetting, ARP, RARP, BOOTP, DHCP, ICMP, Comparison between IPv4 and IPv6.

UNIT V

Transport Layer: Design issues, Process to process delivery, TCP Connection establishment and termination. TCP header format, TCP flow control, TCP congestion control, Timers in TCP. UDP header format, Checksum. Session layer: Authentication, authorization. Presentation formatting and data compression, Domain Name Server (DNS), World Wide Web (WWW), Hypertext Transfer Protocol (HTTP), Remote login: Telnet, File Transfer Protocol (FTP).

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, Pearson Education
2. Computer Networking: A Top-Down Approach, James F. Kurose, Pearson Education
3. Data and Computer Communications, William Stallings, Pearson Education

Reference Books:

1. Computer Networks: A Systems Approach, Peterson, Davie, ELSEVIER.
2. Data Communications & Networking, Behrouz A. Forouzan, Tata McGraw Hill.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
IT3CO22	Software Engineering	3	1	2	5

UNIT I

Software Engineering – Definition, Process, Evolution and Myths, Generic Process Model, Framework, Process Models – Waterfall, Incremental, Evolutionary, Spiral, Component Based Model, Rational Unified Process

UNIT II

Requirement Analysis, Stakeholders, Elicitation Techniques, Requirement Modelling - Use Cases, Activity Diagrams, Swimlane Diagrams, Data Modelling, Data Flow Diagram, Overview of Class Based Modelling, requirement Tracking

UNIT III

Principles of Software Design, Design Concepts – Abstraction, Architecture, Modularity, Relationships, Design Model, Component Design, User Interface Design, Configuration Management

UNIT IV

Software Quality, Approaches for Quality Assurance, Software Testing, Verification and Validation, Types of Testing, Risk Assessment, Risk Mitigation, Monitoring and Management

UNIT V

Software Metrics, Process Metrics, Product Metrics, Function Oriented Metrics, Software Project Estimations, Function Point Based Metrics, COCOMO Models, Project Scheduling, Effort Distribution

Text Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill.
2. Ian Sommerville, Software Engineering, Pearson Education Inc., New Delhi

Reference Book:

1. Fundamentals of Software Engineering by Rajib Mall, – PHI

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
IT3EA06	Natural Language Processing	3	0	0	3

UNIT I

Introduction: Human Languages, Main Approach of NLP, Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Formal Language and Natural Language, Regular Expression and Automata.

UNIT II

Morphology: Text Pre-processing, Tokenization, Feature Extraction from text, Inflectional and Derivational, Finite State Morphological Parsing, Finite State Transducer

Part of Speech Tagging: Rule Based, Stochastic POS, Transformation Based Tagging.

UNIT III

Speech Processing: Speech and Phonetics, Vocal Organ, Phonological Rules and Transducer, Probabilistic Models, Spelling Error, Bayesian Method to Spelling, Minimum Edit Distance, Bayesian Method of Pronunciation Variation.

UNIT IV

N-Grams: Simple N-Gram, Perplexity, Smoothing, Backoff, Entropy, Parsing, Statistical Parsing, Probabilistic Parsing, Treebank.

UNIT V

Application: Sentiment Analysis, Spelling Correction, Word Sense Disambiguation, Machine Translation, Text Classification, Question Answering System.

Text Books

1. Daniel Jurafsky & James H.Martin, Speech and Language Processing, Pearson Education.
2. James Allen, Natural Language Understanding, Pearson Education.

Reference Books

1. Christopher D. Manning and Hinrich Schutze, Foundation of statistical Natural Language Processing, MIT Press.
2. Mary Dee Harris, Introduction to Natural Language Processing, Reston.

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
CS3E106/IT3E106	Cyber Ethics and Laws	3	0	0	3

UNIT I
Introduction, Cyber Ethics, Need of Cyber Ethics, Intellectual Property (IP), IPR Governance, The World Intellectual Property Organization (WIPO).

UNIT II
Cyber Space, Cyber Law, Scope of Cyber Laws: E-Commerce; Online Contracts; IPRs (Patent, Trademarks, Copyright, Industrial Design, Geographical Indication), Right to Access, Right to Privacy, Cyber Law in India with Special Reference to Information Technology Act-2000.

UNIT III
Introduction to Computer and Cyber Crimes, Conventional Crimes, Identity Theft and Fraud, Cyber Terrorism, Cyber Defamation, Cyber Stalking, E-Commerce Frauds, Social Engineering Attacks, Cyber Pornography, Forgery and Fraud, Crime Related to IPRS.

UNIT IV
Cyber Jurisdiction: Introduction to Indian Evidence Act, Indian Patent Act, Introduction to Indian Penal Code, Bankers Book Evidence Act, RBI Act, Information Technology Act 2000 and Amendment in IT Act 2008.

UNIT V
Issues in Cyberspace, Issues Related to IPR, Issues Relating to Investigation, Domain Name Dispute, Issues Relating to Jurisdiction, Issues Relating to Evidence, Case Study, Cyber Crimes.

Text Books:

1. Marjie T. Britz, Computer Forensic & Cyber Crime, Pearson
2. Dr. R.K.Tiwari P.K.Sastri, K.V. Ravi Kumar, Computer Crime and Computer Forensics, First.
3. Verma SK, Mittal Raman, Legal Dimension of Cyber Space, Indian Law Institute, New Delhi.

Reference Books:

1. Vinod V. Sople, Managing Intellectual Property PHI Learning Private Limited.
2. Understanding Forensics in IT, PHI Learning.
3. IT Act 2000 Details *www.mit.gov.in*

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
CS3EL03/ IT3EL03	Information Storage and Management	3	0	0	3

UNIT I

Introduction to Storage Technology: Data Proliferation, Evolution of Various Storage Technologies, Overview of Storage Infrastructure Components, Information Lifecycle Management, Data Categorization.

UNIT II

Storage Systems Architecture: Intelligent Disk Subsystems Overview, Contrast of Integrated vs Modular Arrays, Component Architecture of Intelligent Disk Subsystems, Disk Physical Structure Components, Properties, Performance and Specifications, RAID levels & Parity Algorithms, Hot Sparing, Front End to Host Storage Provisioning, Mapping and Operation.

UNIT III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS Evolution and Comparison. Applications, Elements, Connectivity, Standards, Management, Security and Limitations of DAS, NAS, CAS & SAN.

UNIT IV

Hybrid Storage Solutions; Virtualization: Memory, Network, Server, Storage & Appliances. Data Center Concepts & Requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry Management Standards (SNMP, SMI-S, CIM), Standard Framework Applications, Key Management Metrics (Thresholds, Availability, Capacity, Security, Performance).

UNIT V

Information storage on cloud: Concept of Cloud, Cloud Computing, Storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud Benefits, Cloud Computing Evolution, Applications & Services on Cloud, Cloud Service Providers and Models, Essential Characteristics of Cloud Computing, Cloud Security and Integration.

Text Books:

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) Editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network Explained: Basic and Application of Fiber Channels, SAN, NAS, iSESI, INFINIBAND and FCOE, Wiley India.
3. Saurabh, Cloud Computing: Insight into New Era Infrastructure, Wiley India.

Reference Books :

1. John W. Rittinghouse and James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press, Taylor Frances Pub.
2. Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System and Application, Springer.
3. Rich Schiesser, IT Systems Management: Designing, Implementing and Managing World -class Infrastructures, PHI Learning.

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
IT3EA03	Soft Computing	3	0	0	3

UNIT I

Concept of computing systems, Introduction to soft computing, characteristics, applications of soft computing techniques.

UNIT II

Neural Networks: Biological Neural Network, Different ANNs architectures, Fundamentals, Neural Network Architectures, Feedforward Networks, training techniques in different ANNs, Applications of ANN to solve real world's problems.

UNIT III

Fuzzy Logic: Introduction to Fuzzy logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, propositions, implications and inferences, Defuzzification techniques, Fuzzy logic controller design, Some applications of Fuzzy logic.

UNIT IV

Genetic Algorithms: Concept of "Genetics" and "Evolution" and its application to probabilistic search techniques, Basic GA framework and different GA architectures, GA operators: Encoding, Crossover, Selection, Mutation, etc, Solving single-objective optimization problems using GAs.

UNIT V

Hybrid Systems: Genetic Algorithm based Backpropagation Network, Fuzzy – Backpropagation, Fuzzy Logic Controlled Genetic Algorithms. Case studies.Case studies in Engineering.

Text Books:

1. Sinha, N.K. and Gupta, M. M.: "Soft Computing and Intelligent Systems - Theory and Applications", Academic Press.
2. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis, and Applications, S. Rajasekaran, and G. A. Vijayalakshmi Pai, Prentice Hall of India, 2007.

Reference Books:

1. Soft Computing, D. K. Pratihar, Narosa, 2008.
2. Jang, J-S. R., Sun,C-T, Mizutani, E.: "Neuro–Fuzzy and Soft Computing", Prentice Hall of India.

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
CS3ED06/IT3ED07	Data Science	3	0	0	3

UNIT I

Introduction to Data Science, Definition and Description of Data Science, History and Development of Data Science, Terminologies Related with Data Science, Basic Framework and Architecture, Importance of Data Science in Today's Business World, Primary Components of Data Science, Users of Data Science and its Hierarchy, Overview of Different Data Science Techniques.

UNIT II

Sample Spaces, Events, Conditional Probability and Independence, Random Variables, Discrete and Continuous Random Variables, Densities and Distributions, Normal Distribution and its Properties, Introduction to Markov Chains, Random Walks, Descriptive, Predictive and Prescriptive Statistics, Statistical Inference, Populations and Samples, Statistical Modeling,

UNIT III

Exploratory Data Analysis and the Data Science Process - Basic Tools (Plots, Graphs and Summary Statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study:

UNIT IV

Data Visualization: Basic Principles, Ideas and Tools for Data Visualization, Examples of Inspiring (Industry) Projects, Exercise: Create Your Own Visualization of a Complex Dataset.

UNIT V

NoSQL, Use of Python as a Data Science Tool, Python Libraries: SciPy and sci-kitLearn, PyBrain, Pylearn, Matplotlib, Challenges and Scope of Data Science Project Management.

Text Books:

1. Data Science from Scratch: First Principles with Python 1st Edition by Joel Grus
2. Principles of Data Science by Sinan Ozdemir, (2016) PACKT.
3. Joke Vanderplas, Python Data Science Hand Book, O'Reilly Publication

Reference Books:

1. Data Science for Dummies by Lillian Pierson (2015)
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking by Foster Provost, Tom Fawcett
3. Field Cady The Data Science Hand Book, Wiley Publication

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
IT3E108	Information Security	3	0	0	3

UNIT I

Introduction to Information Security: Security Attacks, Security Services, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

UNIT II

Block Cipher Principles, Data Encryption Standard (DES), Differential and Linear Cryptanalysis, Modular Arithmetic, Euclidean Algorithm, Advanced Encryption Standard (AES).

UNIT III

Public key cryptography: Principles of Public key Cryptosystems, RSA algorithm, Key Management, Diffie Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

UNIT IV

Message Authentication and Hash Functions: Message Authentication codes, Secure Hash Algorithm, HMAC, Digital Signature, Authentication Protocol, Digital Signature Standards.

UNIT V

Authentication Applications: Kerberos, X.509 Authentication service, Pretty Good Privacy, S/MIME, IP Security, Firewalls.

Text Books

1. Stallings William. Cryptography and Network Security, Pearson Education
2. William Stallings and Lawrie Brown, Larry Brown, Computer Security: Principles and Practice, Pearson

Reference Books

1. Matt Bishop, Introduction to Computer Security, Addison-Wesley
2. Buchmann J. A., Introduction to Cryptography, Springer Verlag
3. Schneier Bruce, Applied Cryptography, John Wiley and Sons
4. Atul Kahate, Cryptography and Network Security, TMH

Course Code	Course Name	Hours Per Week			Total Credits
		L	T	P	
OE00018	Python Essentials	3	0	0	3

UNIT I

Basic Introduction: Introduction to Python, History, Features, Command Interpreter and Development Environment-IDLE, Application of Python, Python 2/3 differences, Basic Program Structure-Quotation and Indentation, Operator, Basic Data Types and In-Built Objects.

UNIT II

Function and Sequence: Functions: Definition and Use, Arguments, Block Structure, Scope, Recursion, Argument Passing, Conditionals and Boolean expressions, Lambda Function, Inbuilt Functions (str(),globals(),locals(),vars(),eval(),exec(),execfile(),repr(),ascii()) Sequences: Strings, Tuples, Lists Iteration, Looping and Control Flow, String Methods and Formatting.

UNIT III

File Operation & OOPS Concepts: Reading Config files in Python, Writing Log Files in Python, Understanding Read Functions, read(), readline() and readlines(), Understanding Write Functions, write() and writelines(), Manipulating File Pointer Using Seek.

UNIT IV

OOPS Concepts: Object Oriented Concepts- Encapsulation, Polymorphism, Classes, Class Instances, Constructors & Destructors__init__, __del__, Multiple Inheritance, Operator overloading Properties, Special Methods, Emulating Built-in Types.

UNIT V

Mutable Data Types, Exception and Standard Modules: Dictionaries, Sets and Mutability, Exceptions, List and Dict Comprehensions, Standard Modules-Math, Random Packages.

Text Books

1. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press.
2. Head First Python, Paul Barry, O'REILLY.

Reference Books

1. Mark Luiz, Learning Python, O'REILLY.
2. Jamie Chan, Learn Python in One Day, LCF Publishing.

AU/ FT/ Mech. II YR. ODD SEM

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO17/ ME3CO17/ FT3CO23	CAD Laboratory	0	0	2	1

Course Name proposed to be changed as "CAD Laboratory" from Auto CAD Lab

List of Practical

1. Getting familiar with the CAD Environment. Toolbars, working area, sub menus, working modes. Starting with some basic commands.
2. Study addressing schemes with different commands.
3. Studying basic objects and their commands e.g. circle, donut rectangle, arc, ellipse, polygon.
4. Studying commands that duplicate objects e.g. array, offset and modify commands.
5. Studying Mirror, hatch, adding toolbars and object snap, zoom, text.
6. Making Isometric objects with isometric settings.
7. Applying dimensions (Aligned, Radius, Diameter, Angular). Increasing / Decreasing working area, changing measuring scales.
8. Changing properties of dimensions through style. Modifying properties of objects. Changing dimensions using stretch and extend.
9. Studying setting of CAD environment and Layers. Raster Images and External Reference Files.
10. Working on 4 view ports.
11. Changing views for 3D drawings, studying Solids and 3D objects e.g. box, sphere, cylinder, cone, wedge, torus.
12. Converting basic shapes e.g. circle, rectangle, polygon, ellipse to solids using extrude and revolve.
13. Subtracting solids and extruded objects. Studying 3D command.
14. Wurking with CAD Views, 3D orbit, continuous orbit.
15. Generating finished objects by render.

(11C)